EXHIBIT A

MediaTek, Inc.

v.

Matsushita Electric Industrial Co., Ltd and Panasonic Corporation of North America

Case No.:

COMPLAINT FOR PATENT INFRINGEMENT OF U.S. PATENT NO. 5,970,031 AND DECLARATORY JUDGMENT

EXHIBIT A

US005970031A

United States Patent [19]

Huang et al.

[11] Patent Number: 5,970,031

[45] Date of Patent: Oct. 19, 1999

[54] **COMPACT DISC PLAYER SYSTEM WITH VIBRATION-IMMUNE INTERRUPTED PLAYBACK CAPABILITY**

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[73] Assignee: **United Microelectronics, Corp.**, Taiwan

[21] Appl. No.: **08/970,095**

[22] Filed: **Nov. 13, 1997**

[30] **Foreign Application Priority Data**

Sep. 23, 1997 [TW] Taiwan 86113777

[51] **Int. Cl.**^{6} **G11B 7/00**

[52] **U.S. Cl.** **369/44.28**; 369/54

[58] **Field of Search** 369/60, 59, 48, 369/54, 58, 44.28

[56] **References Cited**

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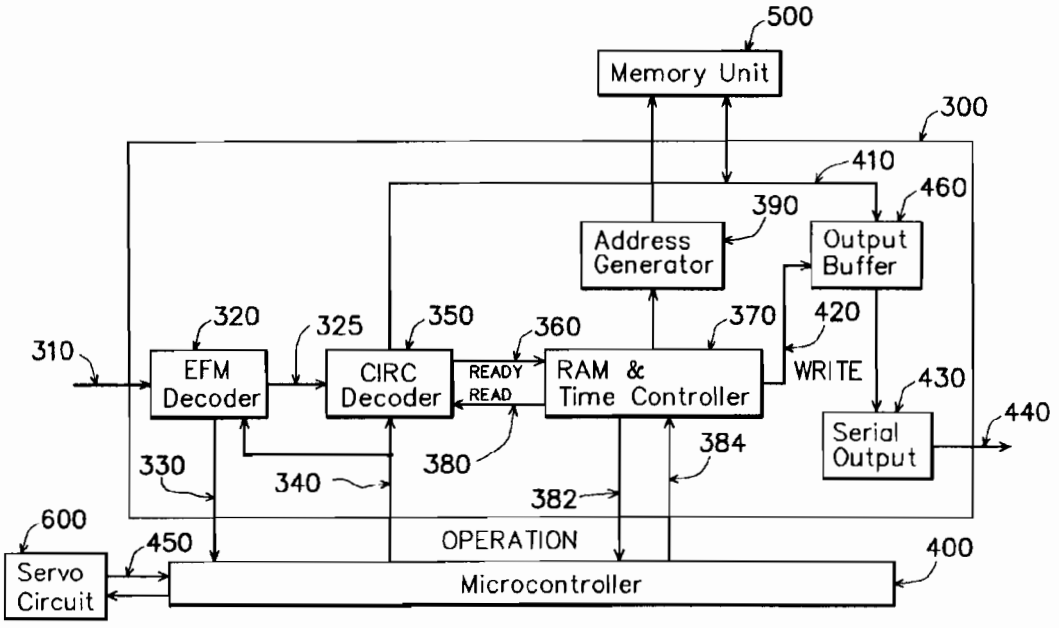
Attorney, Agent, or Firm—Rabin & Champagne, P.C.

[57] **ABSTRACT**

A CD player system with vibration-immune uninterrupted playback capability is provided, which can keep the playback of the audio or video from an optical disc to be uninterrupted even if in the event of external vibrations causing an interrupt to the data reading operation on the optical disc due to defocusing and mistracking of the laser pickup head of the CD player system. The CD player system has a laser pickup head for reading data from an optical disc; servo circuit for controlling said laser pickup head; data processor for decoding the data from said laser pickup head; memory circuit for temporary storage of the output data from said data processor; microcontroller for controlling operations of said servo circuit and said data processor; audio reproduction components for reproducing the output data from said data processing means. Further, the data processor includes a RAM & time controller coupled to said memory unit and said microcontroller. In the event of the occurrence of a defocusing or mistracking condition to said laser pickup head, said servo circuit informs said microcontroller of such a condition, causing said mirocontroller to fetch information about which data frame is being currently written into said memory unit and then command said memory unit to discard the data frame and also command said servo circuit to resume the data reading operation by positioning the laser pickup head at the data frame that precedes the discarded data frame.

10 Claims, 5 Drawing Sheets



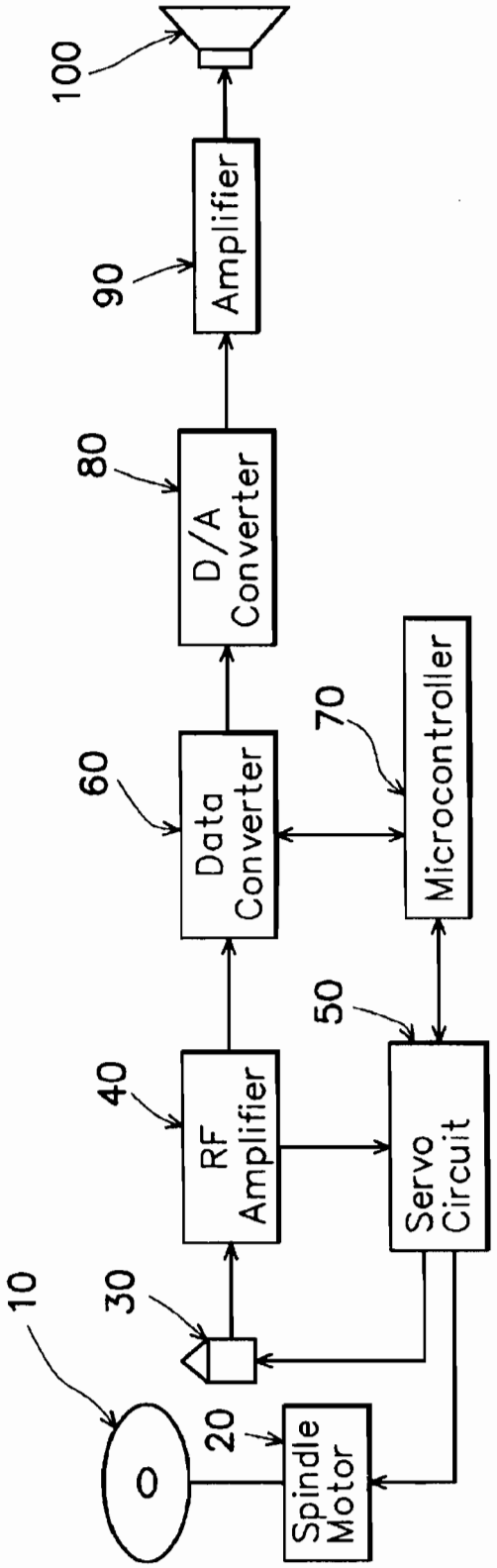


FIG. 1 (PRIOR ART)

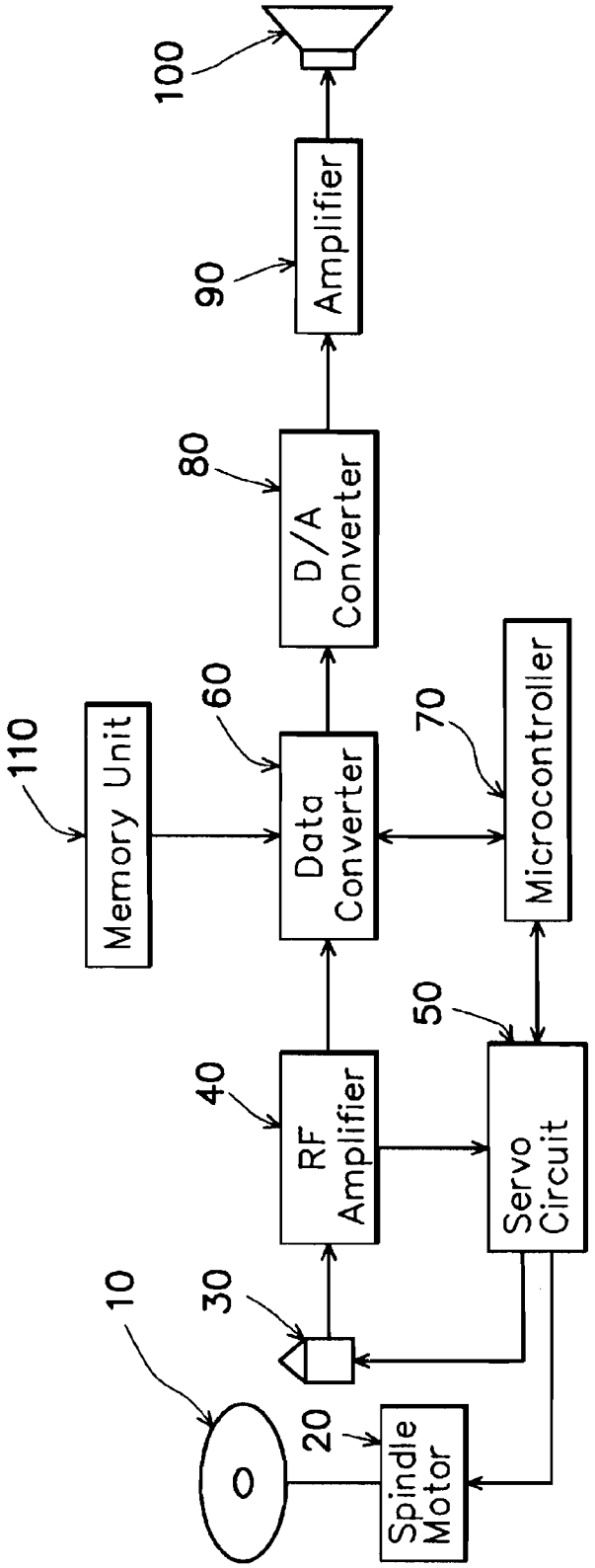


FIG. 2 (PRIOR ART)

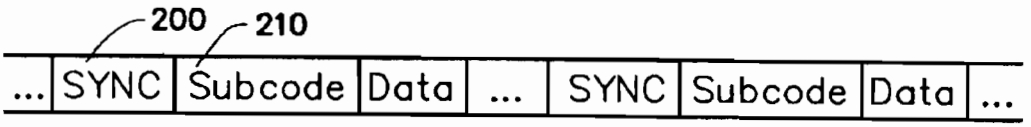


FIG. 3A (PRIOR ART)

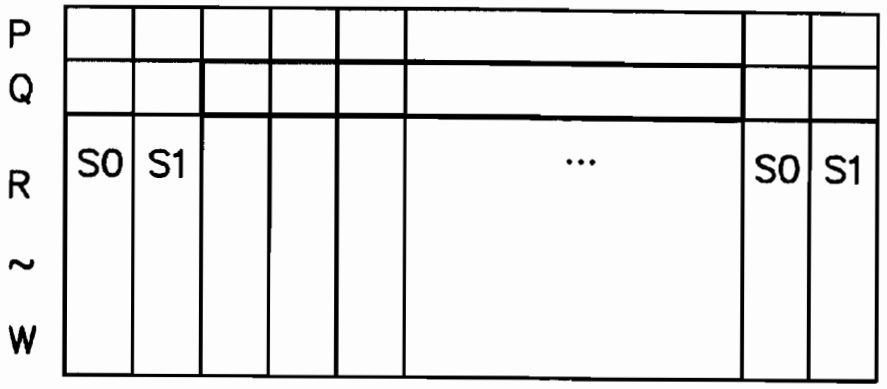


FIG. 3B (PRIOR ART)

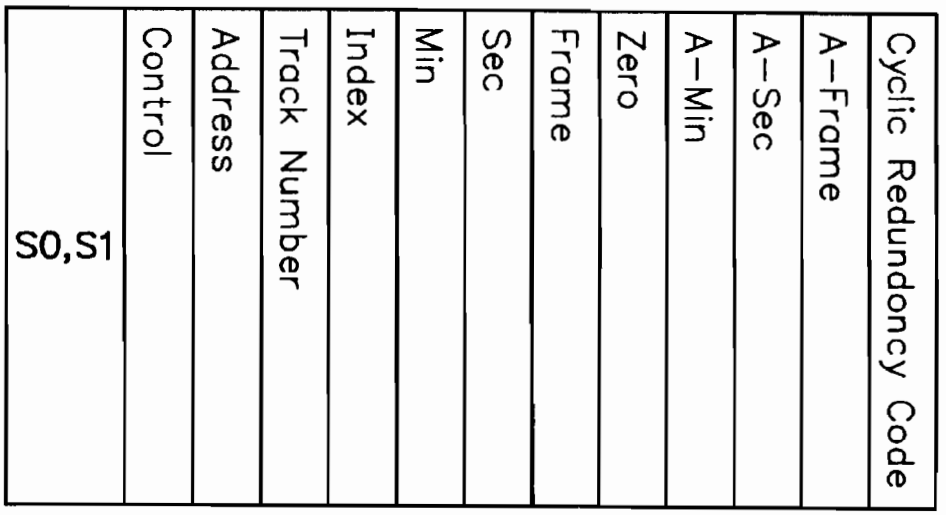


FIG. 3C (PRIOR ART)

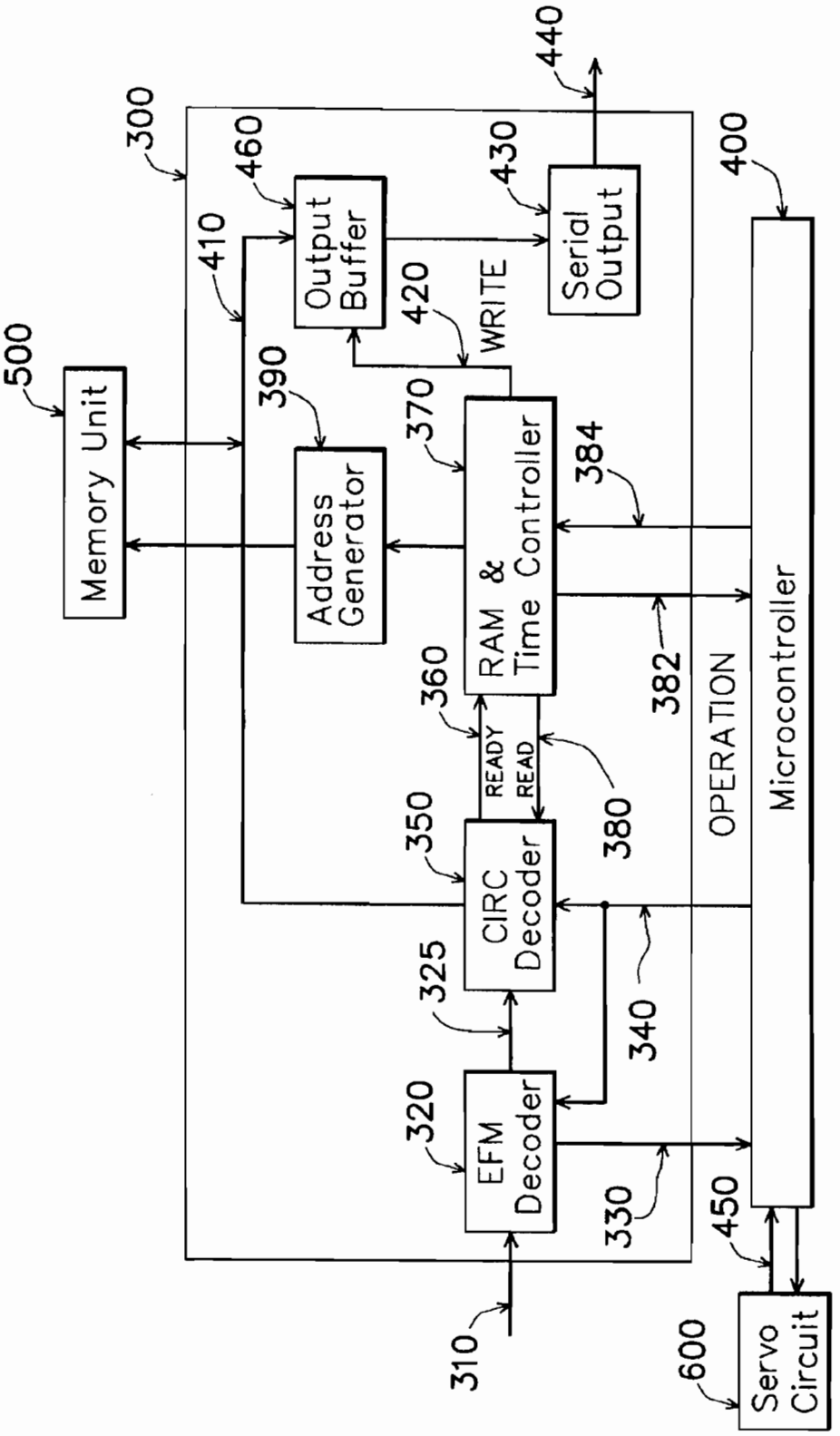

300
440
460
430
400
410
Output Buffer
Serial Output
420
WRITE
500
Memory Unit
390
370
384
Address Generator
RAM & Time Controller
360
382
READY
READ
OPERATION
Microcontroller
350
380
CIRC Decoder
325
340
320
EFM Decoder
330
450
310
600
Servo Circuit

FIG. 4

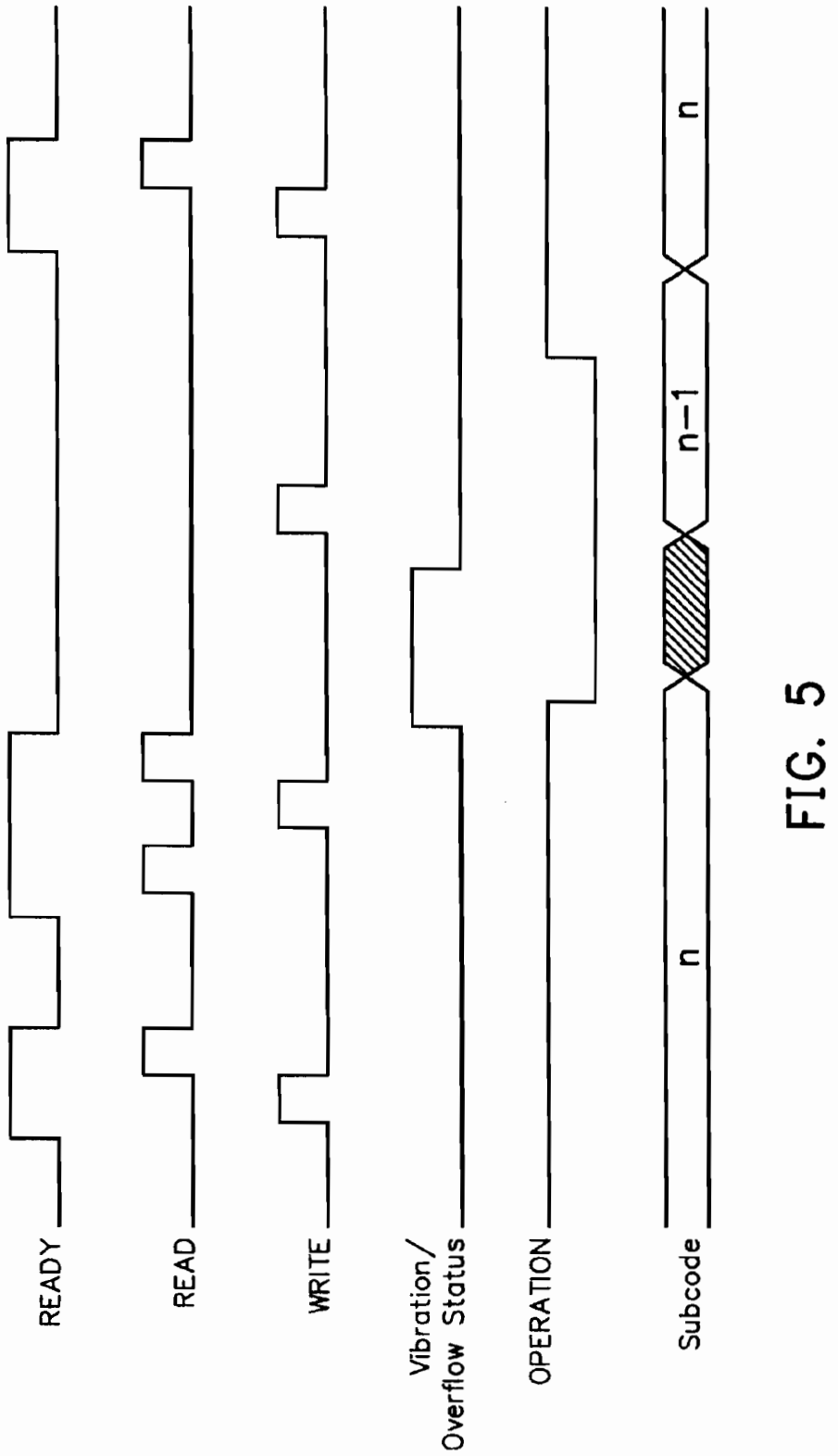

READY
READ
WRITE
Vibration/
Overflow Status
OPERATION
Subcode
n
n-1
n

FIG. 5

COMPACT DISC PLAYER SYSTEM WITH VIBRATION-IMMUNE INTERRUPTED PLAYBACK CAPABILITY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to compact disc (CD) player systems, and more particularly, to a CD player system with vibration-immune uninterrupted playback capability that can prevent interrupt in the audio or video playback in the event of the occurrence of any external vibrations that cause an interrupt in the data reading operation on the optical disc due to defocusing and mistracking of the laser pickup head of the CD player system.

2. Description of Related Art

A CD (compact disc) is an optical disc used to store digital information, such as audio, video, or computer programs and data, characterized in the large storage capacity compared to conventional magnetic storage means. The data stored on a CD can be read out by a laser pickup means. When used to store computer programs and data, it is usually referred to as a CD-ROM (compact-disc read-only-memory). A CD-ROM drive is an input device for personal computers which can handle various kinds of CDs, including video CDs, audio CDs, and CD-ROMs, while a CD player is a electronic device that is capable of reproducing audios from an audio CD.

In the use of a CD-ROM, it is only required that the computer programs or data on the CD-ROM be read out and loaded into the memory of the computer quickly. A short interrupt to the data reading operation on the disc is usually unperceivable by the user. However, in the use of a CD player for playback of audio data, such as musical pieces, a short interrupt to the data reading operation on the disc may cause an interrupt to the audio playback, which is usually intolerable to music lovers.

Interrupts to the data reading operation on the optical disc are usually caused by external vibrations, in that external vibrations can cause jumps—and thereby defocusing and mistracking—to the laser pickup head used for data reading operation on the optical disc. In the case of reading a CD-ROM, such interrupts will only cause a slightly prolonged access time and nothing to the integrity of the programs or data being read out.

In the case of reading an audio or video CD, however, such interrupts will cause intermittent breaks in the continuity of the audio or video playback, which is very unpleasing to the watching eyes and listening ears. This drawback is particularly apparent for CD player systems which are installed on automobiles, in that a running automobile can cause large vibrations to the CD player systems.

One solution to the foregoing problem is to provide a memory buffer to the CD player system. All the playable audio data will be first forwarded to and stored in this memory buffer before they are forwarded to the audio reproduction means. During the time of the occurrence of an interrupt to the data reading operation on the optical disc caused by a defocusing or mistracking of the laser pickup head due to external vibrations, the current contents in the memory buffer can be still used for playback for a short time until the laser pickup head resumes the data reading operation. The following will give a pictorial description of the foregoing conventional CD player systems and their drawbacks in more details.

FIG. 1 shows a schematic block diagram of a typical conventional CD player system used for playback of an optical disc **10**. This CD player system includes a spindle motor **20**, a laser pickup head **30**, a radio frequency (RF) amplifier **40**, a servo circuit **50**, a data processor **60**, a microcontroller **70**, a digital-to-analog (D/A) converter **80**, an amplifier **90**, and a loudspeaker **100**. The spindle motor **20** is used to spin the optical disc **10** at a fixed speed during playback operation to allow the data stored on the optical disc **10** to be read out by the laser pickup head **30**.

The data signal from the laser pickup head **30** is first amplified by the RF amplifier **40**. The output of the RF amplifier **40** is split into two parts: a first part of the amplified signal is transferred to the servo circuit **50** and a second part of the same is transferred to the data processor **60**. The signal transferred to the servo circuit **50** is used for feedback controls of both the speed of the spindle motor **20** and the focusing and tracking of the laser pickup head **30**. These feedback controls are conventional techniques well known in the art and not within the spirit of the invention, so details thereof will not be further described herein.

The amplified signal transferred to the data processor **60** then undergoes various data processing stages, such as eight-to-fourteen modulation (EFM) decoding, subcode acquisition, error correction and detection (ECD), and so on, to thereby obtain the playable audio data. Since the playable audio data are in digital form, they are further converted by the D/A converter **80** into analog form. The output of the D/A converter **80** is then amplified by the amplifier **90** for audible reproduction by the loudspeaker **100**. Moreover, the microcontroller **70** can accept external commands from the user for various controls of the playback.

In the CD player system of FIG. **1**, the laser pickup head **30** is a mechanical component which can be easily subjected to external vibrations that would cause defocusing and mistracking to the laser pickup head **30**. Should this happen, the data reading operation on the optical disc is interrupted, thus causing an interrupt to the audio playback. This drawback is particularly apparent for CD player systems installed on automobiles which would cause large vibrations when running.

FIG. **2** shows a solution to the foregoing problem, in which an additional RAM unit **110** is coupled to the data processor **60** in the CD player system of FIG. **1**. In the CD player system of FIG. **2**, all the output data from the data processor **60** will be first forwarded to the RAM unit **110** and temporarily stored therein before they are forwarded to the audio reproduction means (the D/A converter **80**, the amplifier **90**, and the loudspeaker **100**). In the event that the data reading operation on the optical disc **10** by the laser pickup head **30** is interrupted due to external vibrations, the current contents in the RAM unit **110** can be supplied to the audio reproduction means for uninterrupted playback until the laser pickup head **30** resumes data reading operation. By using this solution, however, it is required that the RAM unit **110** be always filled with enough playable audio data from the data processor **60** that can be fetched for playback during the period the data reading operation on the optical disc **10** is interrupted. The microcontroller **70** will command the spindle motor **20** to speed up the spinning of the optical disc **10** when vibrations occur, and speed down the same when the RAM unit **110** is about to overflow.

Therefore, with the CD player system of FIG. **2**, the audio playback would not be interrupted when the CD player system is subjected to external vibrations that cause defocusing and mistracking to the laser pickup head **30** and thereby an interrupt in the data reading operation on the optical disc **10**. The microcontroller **70** helps to keep the

RAM unit **110** filled with an appropriate "backup" amount of playable audio data by controlling the speed of the spindle motor **20**.

In the foregoing CD player system of FIG. **2**, it is required that, after an interrupt has occurred, the resumed data reading operation start from the interrupted point (i.e., the next byte of audio data following the last byte that has been successfully read out just before the interrupt occurs).

Related patents of CD player systems include the U.S. Pat. No. 5,379,284 "COMPACT DISC PLAYER HAVING AN INTERMEDIATE MEMORY STORAGE DEVICE" to D. G. King, which uses an intermediate memory storage device to keep the audio playback uninterrupted in the event of the CD player system being subjected to external vibrations. Moreover, the U.S. Pat. No. 5,148,417 "TRACKING JUMP COMPENSATOR FOR OPTICAL DISC REPRODUCING APPARATUS" suggests the use of a compensator to keep the audio playback uninterrupted in the event of the CD player system being subjected to external vibrations. These two patents, however, fail to keep the resumed data reading operation to start precisely from the interrupted point.

To solve the foregoing problem, the U.S. Pat. No. 5,615,194 "DISK REPRODUCING APPARATUS AND METHOD FOR REPRODUCING AN AUDIO SIGNAL AND SUBCODE AT N TIMES NORMAL SPEED FROM A DISK" to I. Kimura discloses an apparatus and method which can achieve the so-called one-to-one correspondence of data on the optical disc to keep the resumed data reading operation after an interrupt has occurred to start precisely from the interrupted point. To achieve uninterrupted playback, the disclosed apparatus stores the audio data and associated subcode in a temporary memory unit and then keeps monitoring the subcode from the EFM encoder.

FIG. **3A** is a schematic diagram used to depict a standard data format for storing audio data on an optical disc. As shown, the audio of data of a single musical piece, for example, is divided into a plurality of segments, each of which is preceded with a synchronization code SYNC, as designated by the reference numeral **200**, and a subcode, as designated by the reference numeral **210**, following the SYNC code **200**. Typically, the subcode **210** consists of eight channels, which are usually referred to by the letters P, Q, R, S, T, U, V, and W, respectively. A total of 98 subcodes constitute one data frame.

FIG. **3B** is a schematic diagram used to depict the structure of each subcode. As shown, the subcode includes eight channels P, Q, R, S, T, U, V, and W, each of which begins with two specific pieces of code data S0 and S1. FIG. **3C** shows the contents of channel Q, which include such data fields as (Min: Sec: Frame) and (A_MIN, A_SEC, A_FRAME) which can help the CD player system to resume the data reading operation on the optical disc, after an interrupt has occurred due to vibrations, to start precisely from the interrupted point. For details of this, please refer to the specification of U.S. Pat. No. 5,615,194.

One drawback to the foregoing patent, however, is that, it requires the temporary memory unit to have a large capacity to store the subcode data in addition to audio data. Moreover, it requires quite a complex hardware circuit to implement. These two drawbacks cause the implementation cost of the patent to be very high.

Conventional solutions to the problem of interrupt in the data reading operation on the optical disc due to external vibrations are thus still unsatisfactory. There exists, therefore, a need for a new CD player system which allows the resumed data reading operation on the optical disc, after an interrupt has occurred due to external vibrations, to start precisely from the interrupted point without losing any bytes of audio data between the newly located byte and the last byte that has been successfully read out just before the interrupt occurs.

SUMMARY OF THE INVENTION

It is therefore an objective of the present invention to provide a CD player system which can keep the data reading operation on the optical disc, after an interrupt has occurred due to vibrations, to start precisely from the interrupted point.

It is another objective of the present invention to provide a CD player system which is simple in hardware structure so that the manufacturing cost thereof is low. In accordance with the foregoing and other objectives of the present invention, a new CD player system with vibration-immune uninterrupted playback capability is provided. The CD player system of the invention includes the following constituent parts: a laser pickup head for reading data from an optical disc; servo means for controlling the laser pickup head, data processing means for decoding the data from the laser pickup head into playable form; memory means for temporary storage of the output data from the data processing means; control means, coupled to the servo means and the data processing means, for controlling operations of the servo means and the data processing means; and reproduction means, coupled to the data processing means, for reproducing the output data from the data processing means.

In the foregoing CD player system, the data processing means includes a RAM & time controller coupled to the memory means and the control means; in the event of the occurrence of a defocusing or mistracking condition to the laser pickup head, the servo means informs the control means of such a condition, causing the control means to fetch information about which data frame is being currently written into the memory means and then commands the memory means to discard the data frame and also commands the servo means to resume the data reading operation by positioning the laser pickup head at the data frame that precedes the discarded data frame.

In another aspect, the invention provides a method for use on a CD player system of the type having a laser pickup head for reading data from an optical disc; servo means for controlling the laser pickup head; data processing means for decoding the data from the laser pickup head into playable form; memory means for temporary storage of the output data from the data processing means; control means, coupled to the servo means and the data processing means, for controlling operations of the servo means and the data processing means; and reproduction means, coupled to the data processing means, for reproducing the output data from the data processing means. The method comprises the following steps: in the event of the occurrence of a defocusing or mistracking condition to the laser pickup head, activating the servo means to inform the control means of such a condition; activating the control means to fetch the information about which data frame is currently being written into the memory means; activating the control means to discard the current data frame; activating the control means to command the servo means to resume the data reading operation by positioning the laser pickup head at the previous one of the data frame; and restarting the data reading operation on the optical disc.

BRIEF DESCRIPTION OF DRAWINGS

The invention can be more fully understood by reading the following detailed description of the preferred

embodiments, with reference made to the accompanying drawings, wherein:

FIG. 1 is a schematic block diagram of a typical conventional CD player system;

FIG. 2 is a schematic block diagram of the a conventional CD player system which is capable of preventing interrupt in playback;

FIG. 3A is a schematic diagram used to depict a standard data format for storing audio data on an optical disc;

FIG. 3B is a schematic diagram used to depict the structure of each subcode in each data frame on an audio CD;

FIG. 3C shows the contents of channel-Q of a subcode;

FIG. 4 is a schematic block diagram of the CD player system of the invention; and

FIG. 5 is a waveform diagram showing the timing relationships between various signals used in the CD player system of FIG. 4.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The invention represents an improvement on the CD player system of FIG. 2. Therefore, The CD player system of the invention has the same block structure as that shown in FIG. 2 but differs in that the data processor in the CD player system of the invention, here labeled with the reference numeral **300** is structured in a different manner in accordance with the invention as shown in FIG. 4.

Referring to FIG. 4, in addition to a spindle motor, a laser pickup head, a D/A converter, an amplifier, and a loudspeaker (see FIG. 2), the CD player system of the invention includes a data processor **300** coupled between the RF amplifier and the D/A converter, a microcontroller **400**, a RAM unit **500**, and a servo circuit **600** connected to the spindle motor used to spin an optical disc. In more detail, the data processing circuit **300** includes an EFM decoder **320**, a CIRC (cross-interleaved Reed-Solomon code) decoder **350**, a RAM & time controller **370**, an address generator **390**, an output buffer **460**, and a serial output **430**.

The output of the RF amplifier (see FIG. 2) is transferred to the EFM decoder **320** via the signal line **310**. The EFM decoder **320** is coupled via the signal line **325** to the CIRC decoder **350** and via the signal lines **330**, **340** to the microcontroller **400**. Under control by the microcontroller **400**, the EFM decoder **320** performs an EFM encoding process on the received signal via the signal line **310** from the RF amplifier (see FIG. 2). The output of the EFM decoder **320** is then transferred via the signal line **325** to the CIRC decoder **350** where a CIRC decoding process is performed on the output of the EFM decoder **320**. The CIRC decoder **350** is coupled via the signal lines **360**, **380** to the RAM & time controller **370**, via the signal line **340** to the microcontroller **400**, and via the data bus **410** to both the RAM unit **500** and the output buffer **460**.

The decoded output of the CIRC decoder **350** is transferred via the data bus **410** to the RAM unit **500** to be stored temporarily therein. During normal operations when the CD player system is subjected to no external vibrations, the data from the optical disc is transferred smoothly to the data processor **300** and processed therein to obtain playable audio data which are then transferred to the RAM unit **500**. The playable audio data in the RAM unit **500** are transferred from the RAM unit **500** to the output buffer **460** to be output via the serial output **430** to the audio reproduction means (which includes a D/A converter, an amplifier, and a loudspeaker as those shown in FIG. 2). In the event of the occurrence of external vibrations that cause an interrupt to the data reading operation on the optical disc, resulting in the EFM decoder **320** receiving no signals via the signal line **310**, the current contents in the RAM unit **500**, which are the audio data that have been successfully read out from the optical disc just before the interrupt occurs, still can be transferred via the output buffer **460** and serial output **430** to the audio reproduction means for uninterrupted playback. The foregoing scheme to keep uninterrupted playback when the data reading operation on the optical disc is being interrupted is the same as the prior art of FIG. 2. It is a characteristic part of the invention that, after the laser pickup head resumes normal data reading operation, the starting byte is precisely the one that follows the last byte of the last complete frame that has been successfully read out and stored into the RAM unit **500** before the interrupt occurs.

The RAM & time controller **370** is coupled via the signal lines **382**, **384** to the microcontroller **400**, via the signal lines **360**, **380** to the CIRC decoder **350**, and via the signal line **420** to the output buffer **460**. The RAM & time controller **370** is under control by the microcontroller **400** to instruct the CIRC decoder **350** to perform the CIRC decoding process, and also to enable the output buffer **460** to output data to the serial output **430**.

The microcontroller **400** is used to supervise the various operations of the CD player system and also used to control the servo circuit **600** for speed adjustment of the spindle motor to spin the optical disc at various speeds.

The microcontroller **400** also controls the various operations of the data processor **300** to process the output of the RF amplifier received via the signal line **310**. Through the EFM decoding process by the EFM decoder **320** and subsequently the CIRC decoding process by the CIRC decoder **350**, the received signal can be transformed into playable audio data which is then transferred via the data bus **410** to the RAM unit **500**.

During a playback operation, the RF signal from the RF amplifier (see FIG. 2) is processed by the EFM decoder **320** to obtain the channel-Q data of the subcode. This data is then transferred via the signal line **330** to the microcontroller **400**. In response, the microcontroller **400** issues an operation enable signal OPERATION via the signal line **340** to both the EFM decoder **320** and the CIRC decoder **350**.

In the absence of the OPERATION signal, the CIRC decoder **350** is disabled to receive the output of the EFM decoder **320**. In the presence of the OPERATION signal (which is a high-voltage signal), the EFM decoder **320** is enabled in such a manner that it will hold the transfer of its output to the CIRC decoder **350** until the data frame containing a subcode S0 is received.

Whenever the CIRC decoder **350** completes the decoding process, it issues a READY signal via the signal line **360** to the RAM & time controller **370**. When data has been fetched away, the RAM & time controller **370** issues a READ signal via the signal line **380** to the CIRC decoder **350**. Meanwhile, the RAM & time controller **370** enables the address generator **390** to generate an address signal to the RAM unit **500**, allowing the output data from the CIRC decoder **350**, which is put on the data bus **410**, to be written into the corresponding address in the RAM unit **500**.

During playback operation, the RAM & time controller **370** issues a WRITE signal at a fixed rate via the signal line **420** to the output buffer **460**, enabling the output buffer **460** to fetch data on the data bus **410**. The output of the output buffer **460** is converted by the serial output **430** into a serial

sequence of bits which are then transferred via the data line **440** to the audio reproduction means.

In the event of the occurrence of external vibrations which cause defocusing and mistracking to the laser pickup head during the playback operation, the servo circuit **600** will issue a notifying signal via the signal line **450** to the microcontroller **400**. In response, the microcontroller **400** switches the OPERATION signal on the signal line **340** to a low-voltage state. At this time the RAM & time controller **370** fetches the information about which data frame is currently being written into the RAM unit **500**. The microcontroller **400** then fetches this information from the RAM & time controller **370**, and then commands the RAM & time controller **370** to abandon the current data frame. Meanwhile, the microcontroller **400** commands the servo circuit **600** to try to resume the focusing and tracking of the laser pickup head in such a manner as to reposition the laser pickup head precisely at the data frame preceding the abandoned one. As the laser pickup head has achieved this, the microcontroller **400** then switches the OPERATION signal on the signal line **340** to a high-voltage state so as to resume the data reading operation.

The RAM & time controller **370** is not required to keep monitoring on the subcode data from the EFM decoder **320**. After an interrupt has occurred, the microcontroller **400** will inform the RAM & time controller **370** that the subsequently received data is from the newly started byte and also transfer the subcode of the newly picked data to the same. Thereafter, the RAM & time controller **370** will operate independently to check and register the amount of data that has been received from the CIRC decoder **350**. As each data frame is received (in compliance with the IEC 908 standard, each frame of audio data includes 2,352 bytes), the RAM & time controller **370** adds the channel-Q code in the subcode forward by one to thereby determine which frame the current output data from the CIRC decoder **350** belongs to.

In addition, the RAM & time controller **370** can inform the microcontroller **400** of the overflow status of the RAM unit **500**. In response, the microcontroller **400** controls the servo circuit **600** to adjust the spinning speed of the optical disc such that the access speed can be adjusted to suitable levels that allow the RAM unit **500** to be loaded with adequate amount of playable audio data.

FIG. **5** is a waveform diagram showing the timing relationships between the various signals used in the CD player system of FIG. **4**. As shown, the RAM & time controller **370** switches the READ signal on the signal line **380** to a high-voltage state when the CIRC decoder **350** switches the READY signal on the signal line **360** to a high-voltage state, allowing the output data from the CIRC decoder **350** to be written into the RAM unit **500**. The WRITE signal on the signal line **420** generated by the RAM & time controller **370** is a pulse train of a fixed rate.

In the event of the occurrence of a vibration condition to the laser pickup head or an overflow condition to the RAM unit **500**, it will cause the VIBRATION/OVERFLOW status signal to be triggered into a high-voltage state. In response to this, the microcontroller **400** will switch the OPERATION signal to a low-voltage state so as to disable the transfer of data from the EFM decoder **320** to the CIRC decoder **350** and also to reset the CIRC decoder **350**. Assume that at the instant of the occurrence of this interrupt, the data frame that is currently being written into the RAM unit **500** is the (n)th one. In response to this information, the microcontroller **400** commands the servo circuit **600** to search for the (n−1)th data frame and then position the laser pickup head **30** at this data frame to restart the data reading operation. Meanwhile, the OPERATION signal is switched back to the high-voltage state, thereby enabling the EFM decoder **320** and CIRC decoder **350** to resume operation. Until the subcode of S0 is received by the EFM decoder **320**, the subsequent audio data is then decoded and transferred to the RAM unit **500**, thus maintaining the continuity of the audio playback.

In conclusion, the CD player system of the invention can achieve the objectives of keeping the data reading operation on the optical disc, after an interrupt has occurred due to vibrations, to start precisely from the interrupted point, and which is simple in hardware structure so that the manufacturing cost thereof is low.

The invention has been described using exemplary preferred embodiments. However, it is to be understood that the scope of the invention is not limited to the disclosed embodiments. On the contrary, it is intended to cover various modifications and similar arrangements. The scope of the claims, therefore, should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.

What is claimed is:

1. A CD player system with vibration-immune uninterrupted playback capability, which comprises:

laser pickup head for reading data from an optical disc that is an audio CD containing audio data thereon;

servo means for controlling said laser pickup head;

data processing means for decoding the data from said laser pickup head into playable form;

memory means for temporary storage of the output data from said data processing means;

control means, coupled to said servo means and said data processing means, for controlling operations of said servo means and said data processing means; and

reproduction means, coupled to said data processing means, for reproducing the output data from said data processing means;

wherein

said data processing means includes:

a RAM & time controller coupled to said memory means and said control means;

an EFM decoder from performing an EFM decoding process on the data read from said optical disc;

a CIRC decoder, coupled to said RAM & time controller, for performing a CIRC decoding process on the output data from said EFM decoder;

an address generator, coupled to said RAM & time controller, for generating an address signal to said memory means; and

output means, under control by said RAM & time controller, for outputting data from said memory means to said reproduction means;

wherein in the event of the occurrence of a defocusing or mistracking condition to said laser pickup head, said servo means informing said control means of such a condition, causing said control means to fetch information about which data frame is being currently written into said memory means and then command said memory means to discard the data frame and also command said servo means to resume the data reading operation by positioning said laser pickup head at the data frame that precedes the discarded data frame, and

wherein in the event of the occurrence of a defocusing or mistracking condition to said laser pickup head, said control means performs the steps of: disabling

said EFM encoder; resetting said CIRC decoder; fetching the information about which data frame is currently being written into said memory means; commanding said servo means to resume the data reading operation by positioning the laser pickup head at the previous one of the data frame; and enabling said EFM decoder to restart the EFM decoding process when the next subcode appears.

2. The CD play system of claim 1, wherein said specified subcode S0 subcode defined by a data format of an audio CD.

3. The CD play system of claim 1, wherein said control means comprise a microcontroller.

4. The CD play system of claim 1, wherein said control means comprises a microprocessor.

5. The CD player system of claim 1, wherein said control means comprises:

a D/A converter for converting the digital output from said data processor into analog form;

an amplifier for amplifying the analog output of D/A converter; and

a loudspeaker for reproducing the analog output of said amplifier into audible form.

6. A method for use on a CD player system of the type having a laser pickup head for reading data from an optical disc that is an audio CD containing audio data thereon, servo means for controlling said laser pickup head; data processing means for decoding the data from said laser pickup head into playable form; memory means for temporary storage of the output data from said data processing means; control means, coupled to said servo means and said data processing means, for controlling operations of said servo means and said data processing means; and reproduction means, coupled to said data processing means, for reproducing the output data from said data processing means; wherein the data processing means includes:

an EFM decoder for performing an EFM decoding process on the data read from the optical disc;

a CIRC decoder, coupled to a RAM & time controller, for performing a CIRC decoding process on the output data from said EFM decoder;

an address generator, coupled to said RAM & time controller, for generating an address signal to said memory means; and

output means, under control by said RAM & time controller, for outputting data from said memory means to said reproduction means; said method comprising the steps of:

in the event of the occurrence of a defocusing or mistracking condition to said laser pickup head, activating said servo means to inform said control means of such a condition;

activating said control means to fetch the information about which data frame is currently being written into said memory means;

activating said control means to discard the current data frame;

activating said control means to command said servo means to resume the data reading operation by positioning the laser pickup head at the previous one of the data frame; and

restarting the data reading operation on the optical disc,

wherein in the event of the occurrence of a defocusing or mistracking condition to said laser pickup head, said control means performs the steps of: disabling said EFM encoder; resetting said CIRC decoder; fetching the information about which data frame is currently being written into said memory means; commanding said servo means to resume the data reading operation by positioning the laser pickup head at the previous one of the data frame; and enabling said EFM decoder to restart the EFM decoding process when the next subcode appears.

7. The method of claim 6, wherein said specified subcode is the S0 subcode defined by a data format of an audio CD.

8. The method of claim 6, wherein said control means comprises a microcontroller.

9. The method of claim 6, wherein said control means comprises a microprocessor.

10. The method of claim 6, wherein said audio reproduction means comprises:

a D/A converter for converting the digital output from said data processor into analog form;

an amplifier for amplifying the analog output of said D/A converter; and

a loudspeaker for reproducing the analog output of said amplifier into audible form.

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